



Energy Promotion and Development Division

Montana Department of Commerce



MONTANA'S ENERGY ECONOMY

EPDD Mission



Energy Promotion and Development Division

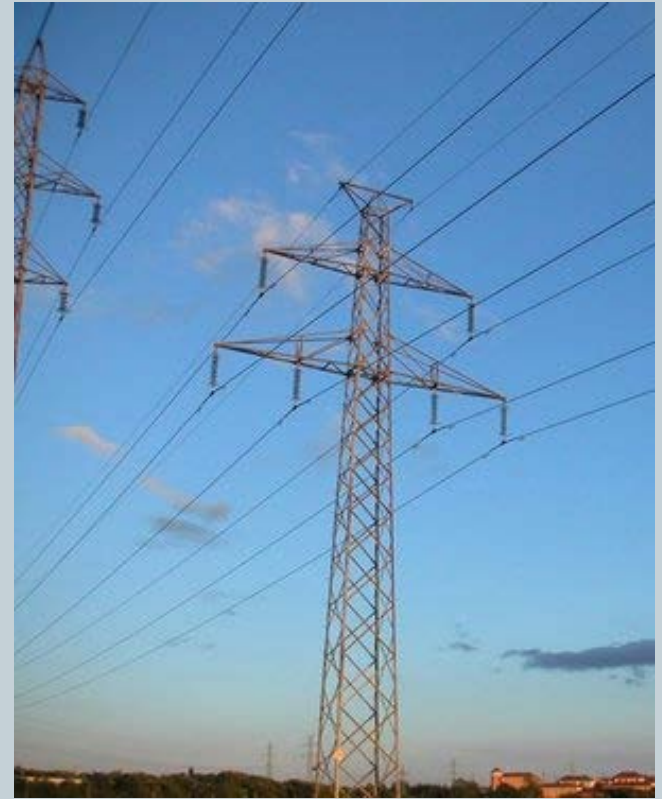
Montana Department of Commerce

- Foster creation of high quality jobs
- Increase tax base
- Increase Montana energy production

EPDD Activities



- Due diligence/research on potential partnerships, businesses, and technologies
- Identify and secure funding assistance for energy development projects
- Bring national energy companies to Montana to explore our resources
- Facilitate discussions between potential partnerships
- Monitor energy projects and assist as needed



The Schweitzer Energy Policy



- Long term, sustainable, reliable, and affordable energy
- Economic growth
- National energy independence
- Clean energy technology
- Clean and healthful environment
- Maintain the Montana quality of life



A Diverse, Balanced Energy Portfolio

Traditional Energy Resources

- Coal
- Oil
- Natural Gas



Renewable Energy Resources

- Wind
- Geothermal
- Hydroelectric
- Bioenergy



Montana Energy Highlights



- #1 in U.S. coal deposits
- #1 in wind potential class 3 and above
- More than 15 locations for potential geothermal energy
- Oil production doubled in the last decade
- 16.5 million acres of crop land
- 19 million acres of non-reserved forest
- First completely merchant transmission line in the west

Montana Energy Policy Highlights



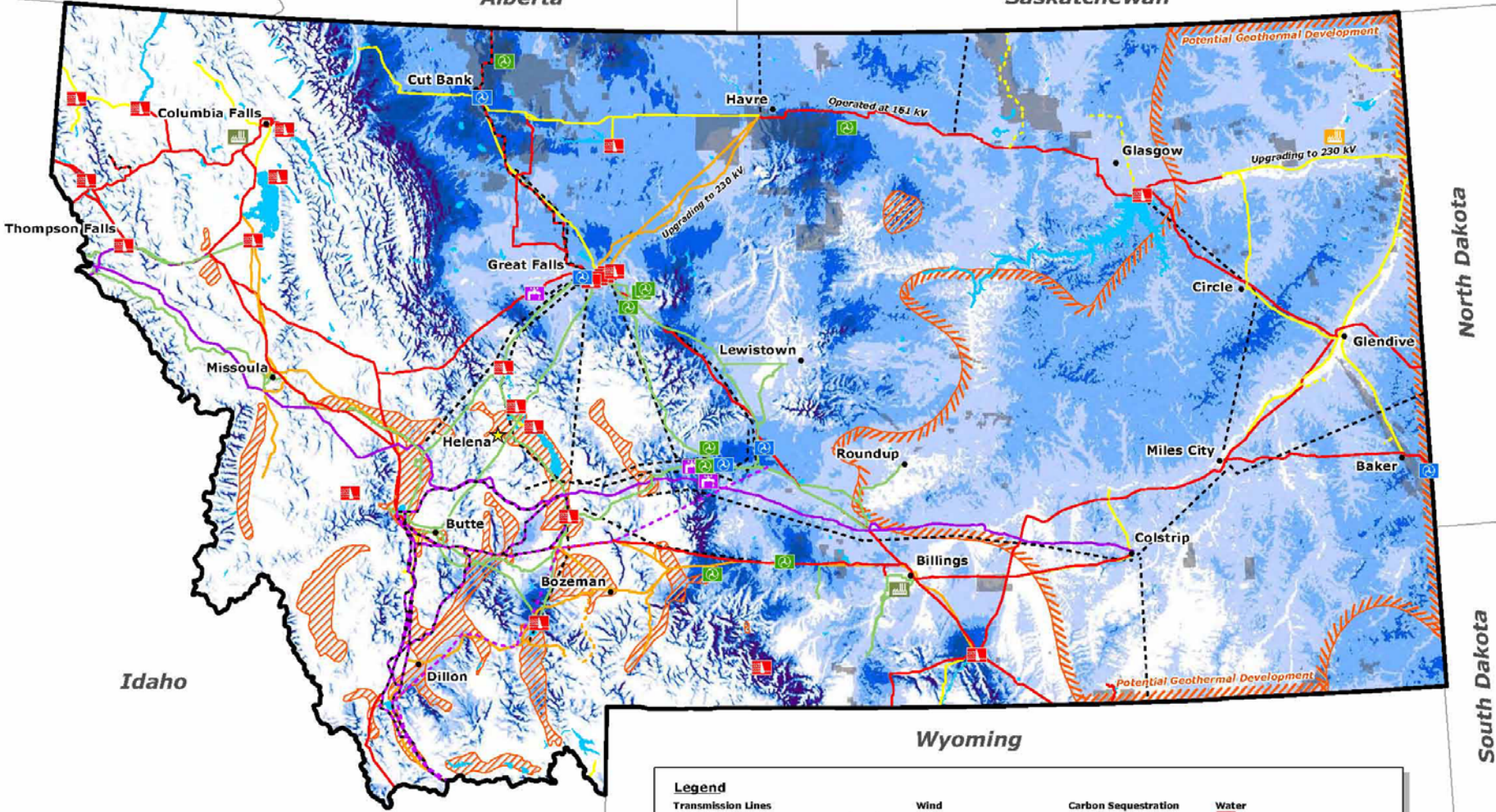
- RPS = 15% by 2015
- Tax Abatements for:
 - RE manufacturing
 - Energy R&D
 - Transmission lines
- Oil production tax holiday
 - 18-month horizontal well
 - 12-month vertical well
- Clean and Green Tax Incentives
 - 50% tax reduction on Coal plants capturing CO₂ and CO₂ pipelines
 - 50% tax reduction on wind farms
 - 87% tax reduction on RE transmission
 - Renewable energy manufacturing
 - Energy R&D

Renewable Energy Resources

British Columbia

Alberta

Saskatchewan



Legend

Transmission Lines			Wind	Carbon Sequestration	Water
<i>In Service</i>	<i>In Progress</i>	<i>Being Planned</i>	Operating Wind Farms	CO2 Sink	Hydroelectric Dams
500 kV	500 kV	500 kV (DC)	Planned Wind Farms	Energy Recovery Projects	Planned Pumped Hydroelectric
230 kV	230 kV	161 kV	Wind Power Class	Waste Heat	
161 kV	115 kV	115 kV	3	Methane Collection	
115 kV	100 kV	Conceptual	4	Geothermal	
100 kV			5	Potential Development	
			6		
			7		
			<i>Watts/square meter @ 50m elevation</i>		

Map Sources:
 Transmission Lines: Department of Environmental Quality
 Wind Farms: Department of Environmental Quality
 Wind Power Class: TrueWind Solutions (2002)
 Potential Geothermal Development: Idaho National Engineering & Environmental Laboratory (2003)
 CO2 Sinks: NatCarb (2006 Atlas - Oil & Gas Reservoirs)
 Gas Storage Units: Board of Oil & Gas Conservation
 Hydroelectric Dams: Department of Fish, Wildlife and Parks
 Pumped Hydroelectric: Department of Environmental Quality
 Energy Recovery: Department of Environmental Quality

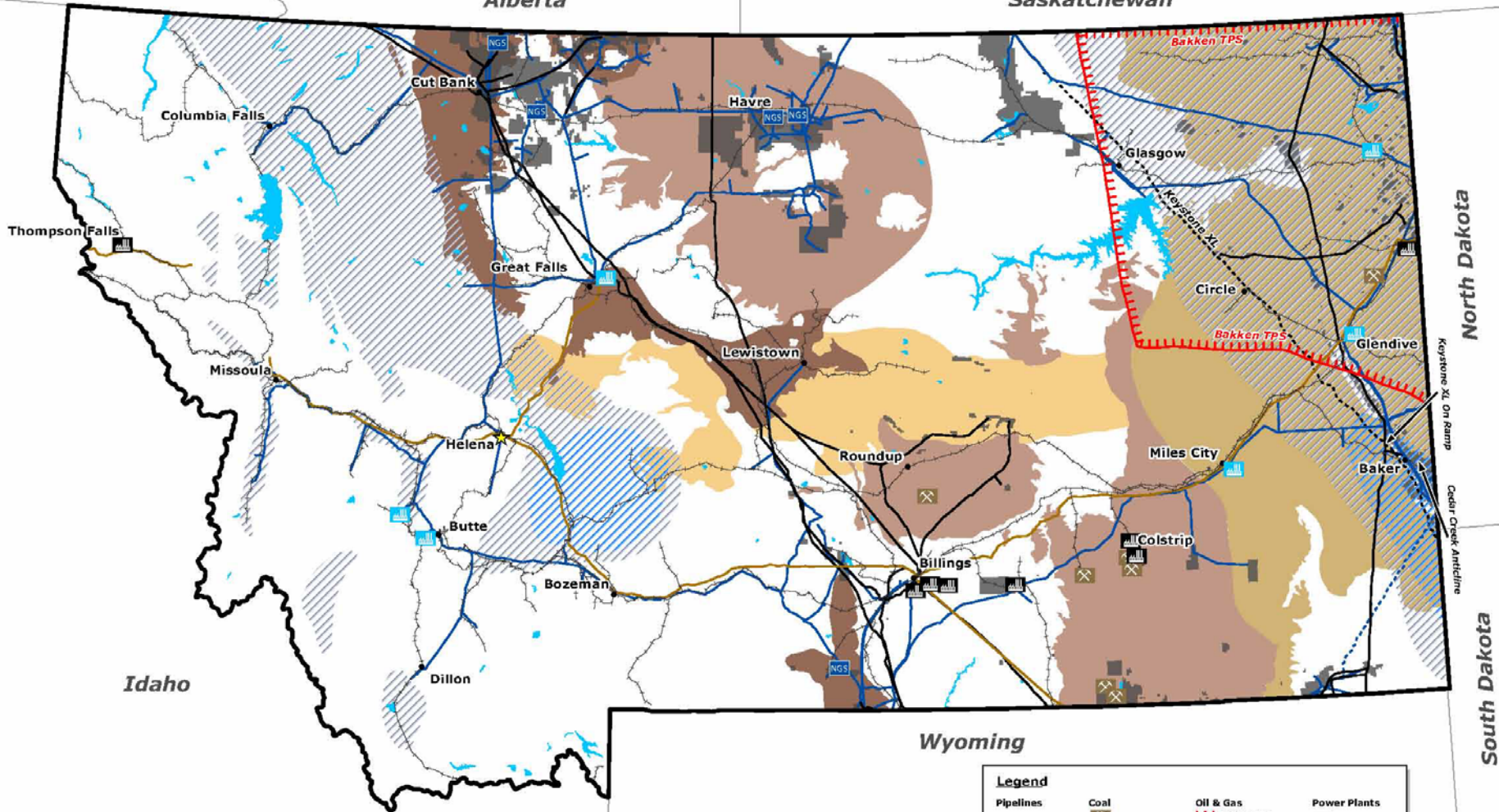


Traditional Energy Resources

British Columbia

Alberta

Saskatchewan



North Dakota

Keystone XL On Ramp
Cedar Creek Archline

South Dakota

Idaho

Wyoming

Legend

Pipelines	Coal	Oil & Gas	Power Plants
<i>In Service</i>	Coal Mines	Bakken TPS	Coal
Natural Gas	Coal Shale Deposits	Oil & Gas Fields	Natural Gas
Crude Oil	Bituminous	Shale Gas Plays	
Refined Oil	Sub-bituminous	Shale Gas Basins	
<i>In Progress</i>	Lignite	NGS Natural Gas Storage Units	
Natural Gas	Oil-shale		
Crude Oil			
	Railroads		

0 5 10 20 30 40 Miles

Map Sources
 Pipelines: Department of Environmental Quality
 Coal Mines: Department of Environmental Quality
 Coal Shale Deposits: Montana State University (1974)
 Bakken TPS (Bakken-Lodgepole Total Petroleum System): United States Geological Survey (2008)
 Oil & Gas Fields: Board of Oil & Gas Conservation
 Shale Gas Plays & Basins: US Energy Information Administration
 Coal Power Plants: Department of Environmental Quality
 Natural Gas Storage Units: Board of Oil & Gas Conservation

Energy Industry Across Montana



- **Coal**

- New mines
- Export development

- **Oil**

- Bakken boom
- Keystone XL

- **Transmission**

- MATL
- Colstrip upgrades
- MSTI

- **Wind**

- Rim Rock
- PTC Expiration?

- **Bioenergy**

- Potential biofuels projects

MT is Coal Country



Montana's Coal Reserves

120 Billion Tons

28% Nation's Coal

8% World's Coal

Coal Mining in Montana

Existing Mines

- Decker Coal Co. at Decker, MT
- Spring Creek Coal Co. at Decker, MT
- Western Energy Co. at Colstrip, MT
- Signal Peak Energy at Roundup, MT
- Westmoreland Resources at Hardin, MT
- Total of approx 40mm tons/ yr

Otter Creek

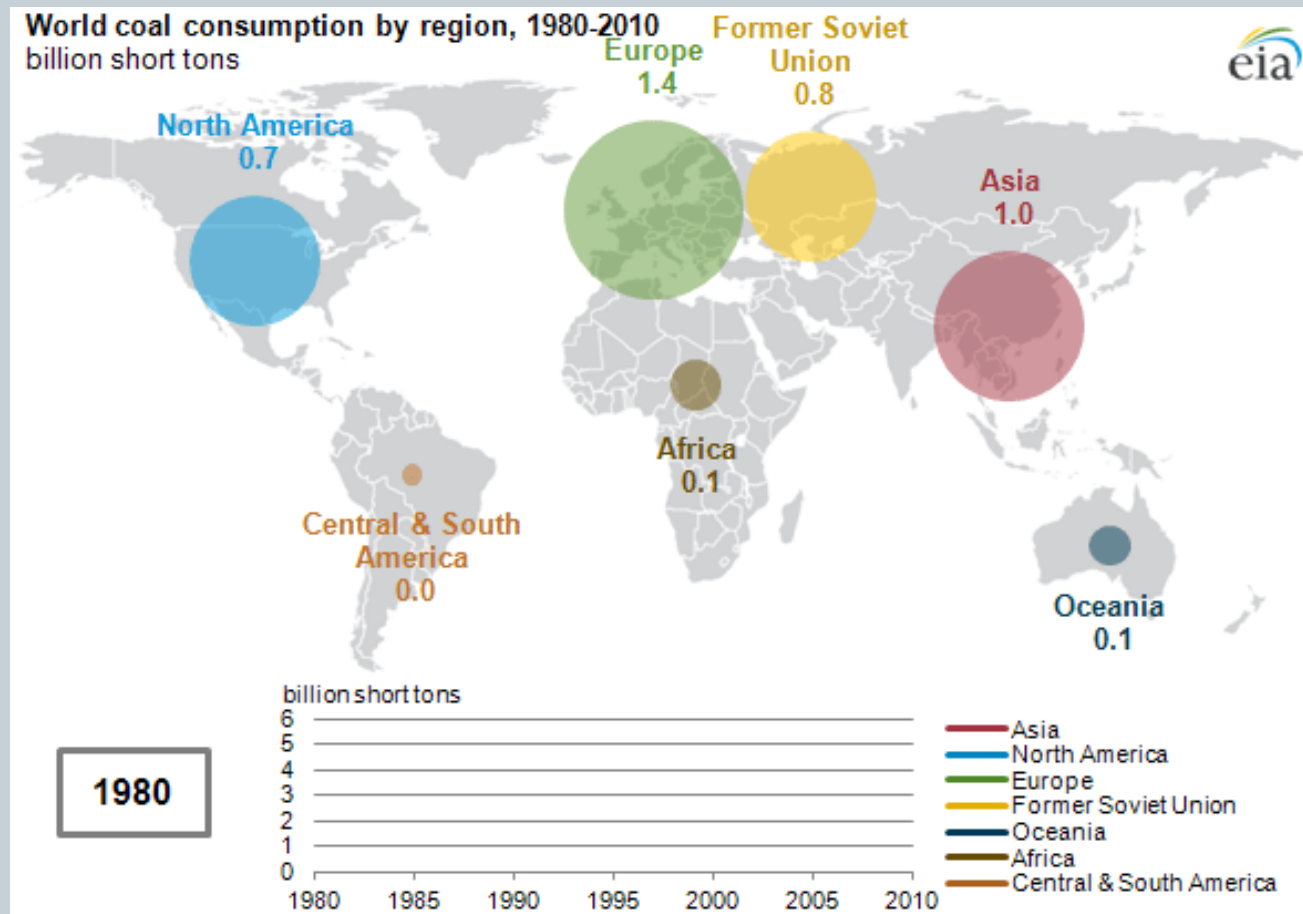
- 1.4 billion tons of coal
- Tongue River Railroad
- Pacific ports
- Far east markets
 - Pacific Rim
 - India

Issues Impacting MT Coal Development



- **Asian Demand**
 - Port development
- **New Mines & Expanded Production**
 - Otter Creek, Carpenter Creek, Bridger-Fromberg, Pace American
 - New Ownership at Decker
- **Advanced Coal Projects**
 - Big Sky CSP- Kevin Dome
- **Legal Challenges**
 - Otter Creek Lease
 - Tongue River Railroad STB Permit

Increasing Asian Demand for Coal



Source: U.S. Energy Information Administration, International Energy Statistics

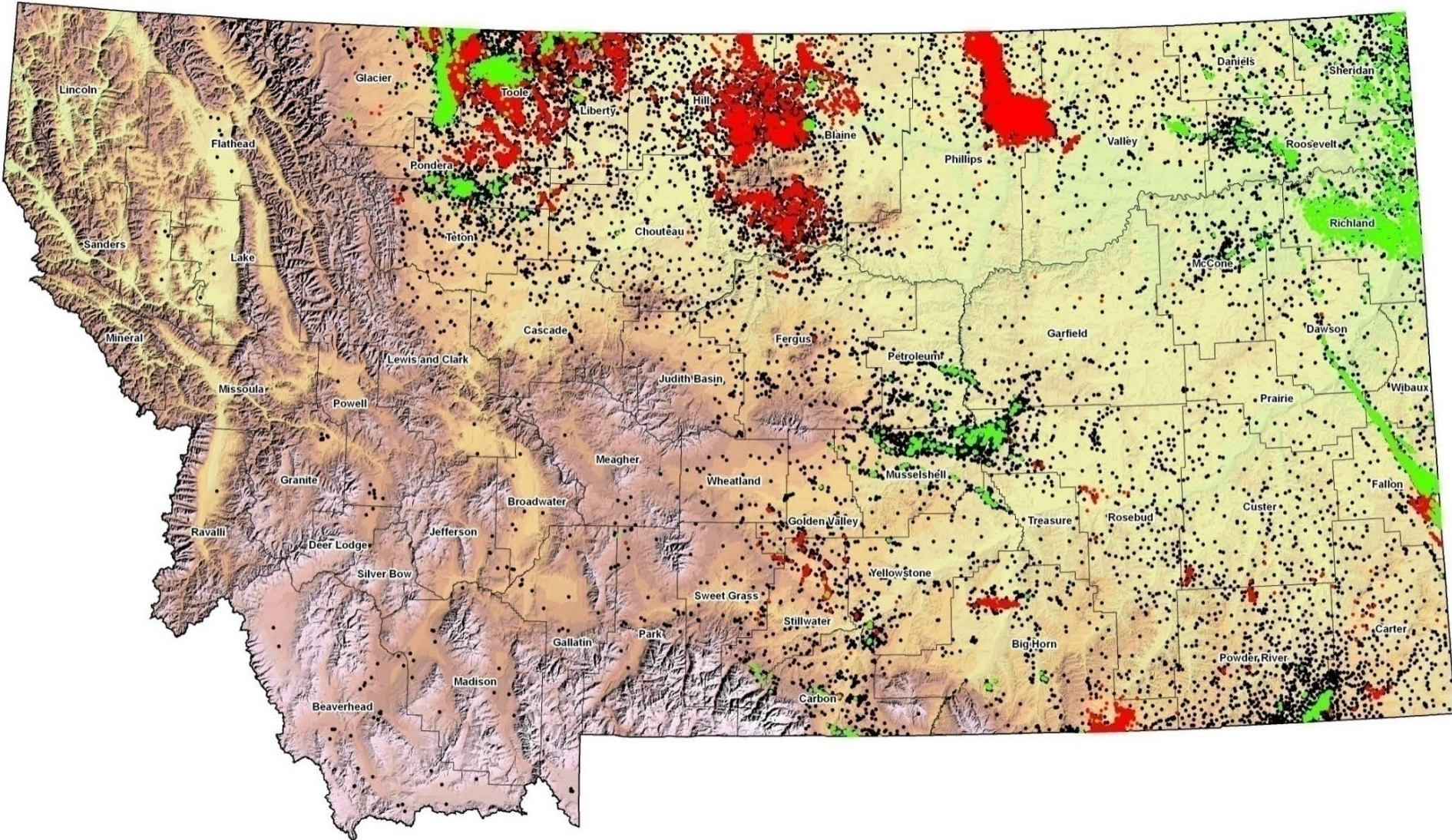
Infrastructure Needed for Coal Exports



- Current coal export, through BC ports, at capacity
- Development of at least 2 new ports in Washington
 - Port of Longview- up to 60 mm tons/yr
 - Cherry Point Port- up to 48 mm tons/yr
- Tongue River Railroad



Montana Oil and Gas Production



Bakken Shale Production 1985-2010 Williston Basin, ND & MT

2010

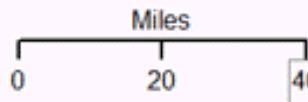
Bakken Shale Producing Wells
Bbl Oil per Day (Mean per Quarter)

- 0 - 100
- 101 - 500
- > 500

Gas-Oil Ratio (Mean per Quarter)

- 0 - 1,000 (Oil Bbl >>> Gas BOE)
- 1,001 - 6,000 (Oil Bbl > Gas BOE)
- > 6,000 (Gas BOE > Oil Bbl)

Bakken Depositional Limit



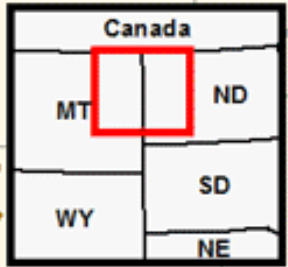
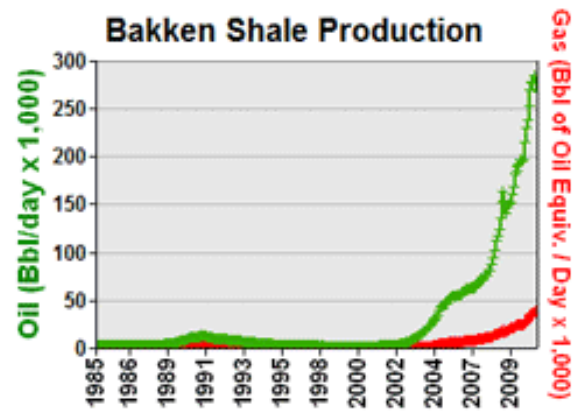
1996: Middle Bakken Vertical well Tests Elm Coulee Field

2000: Elm Coulee Middle Bakken Horizontal wells Discovery

2006: Parshall Field discovered

1987: Upper Bakken Shale Horizontal Wells Billings Nose

1976: Upper Bakken Shale, Vertical wells Billings Nose

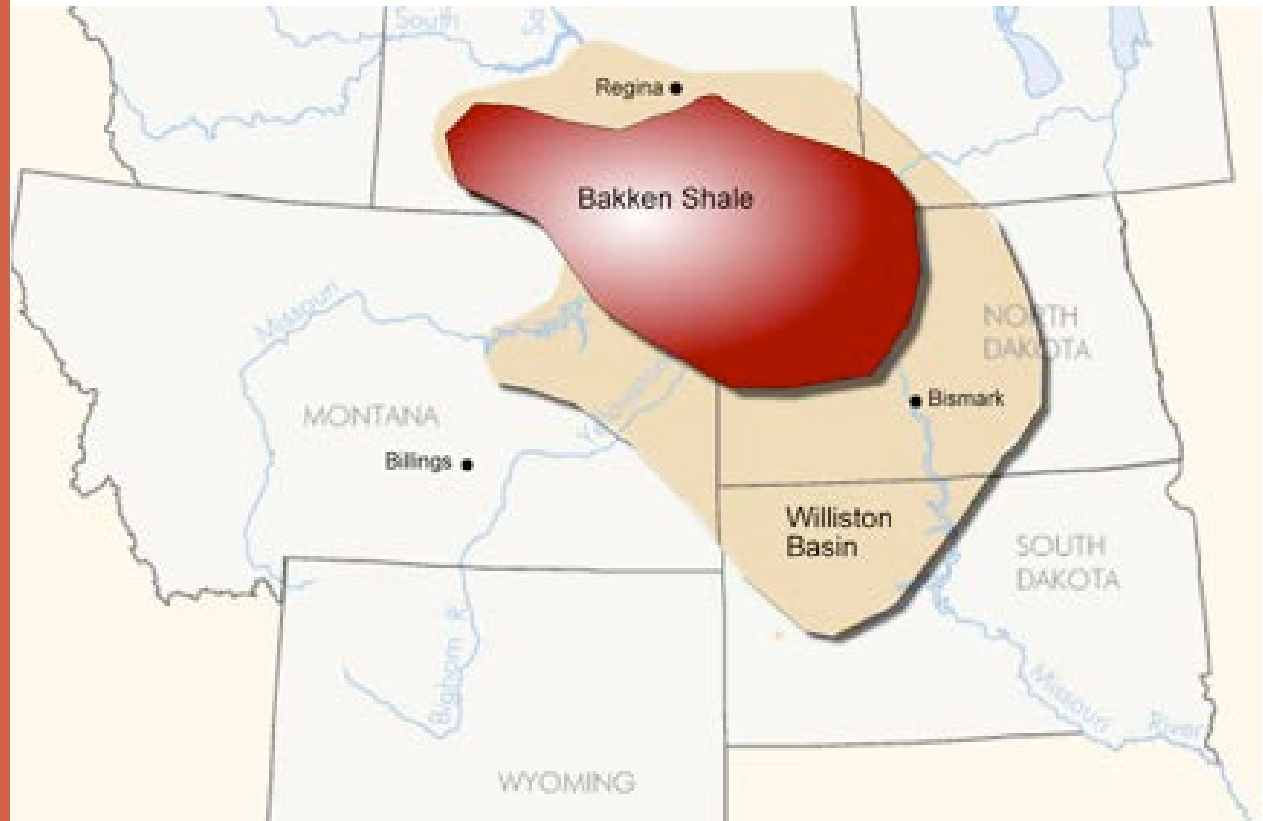




Bakken Formation

- 4.3 billion recoverable barrels (increasing)
- Sweet, light crude
- ~100% drilling success rate due to horizontal drilling and hydraulic fracturing
- MT wells over 3,000 barrels/day
- ND wells over 5,000 barrels/day

Bakken Production for Domestic Supply



MT Oil and Gas



- 2010 value of MT oil production~ \$1.8 billion
 - 12 active drilling rigs, up from 9 in the last year
- Industry agrees MT's business climate and tax structure not detrimental to increased drilling:
 - Brigham Energy: "They (Montana) have a good operating environment." (Billings Gazette May, 2011)
- 8th best overall tax climate for business (Tax Foundation 2012)
- Teton County
 - 68% of State Trust land leased

The Truth About MT Oil Taxes



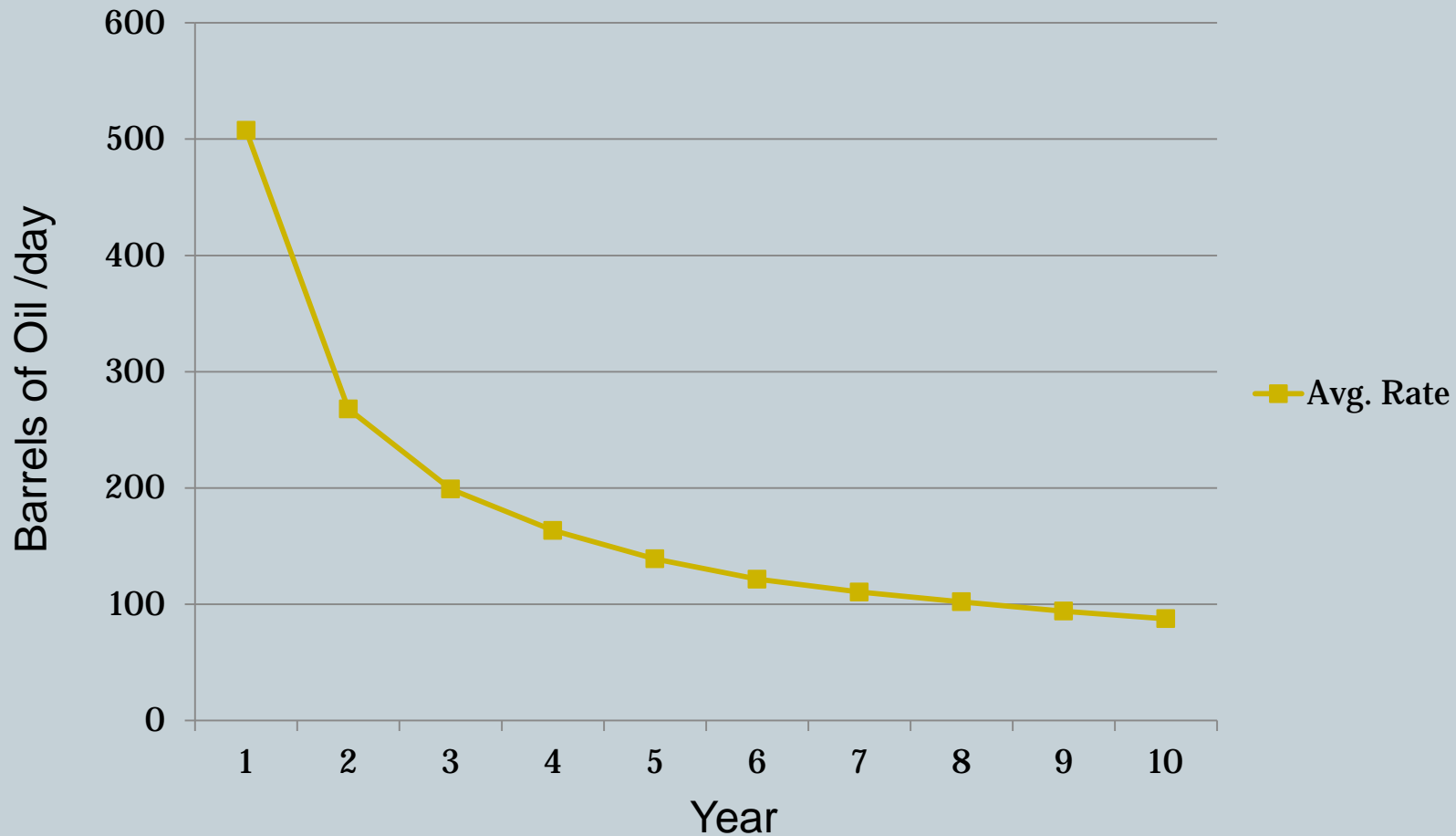
Montana's tax rate on oil is lower than North Dakota's

	Montana	North Dakota	ADVANTAGE
Tax Rate	9.25%	11.5%	Montana
Tax Holiday	18 mo. (0.5%)	Only if oil <\$50.07	Montana

“Typical” Bakken Well Production



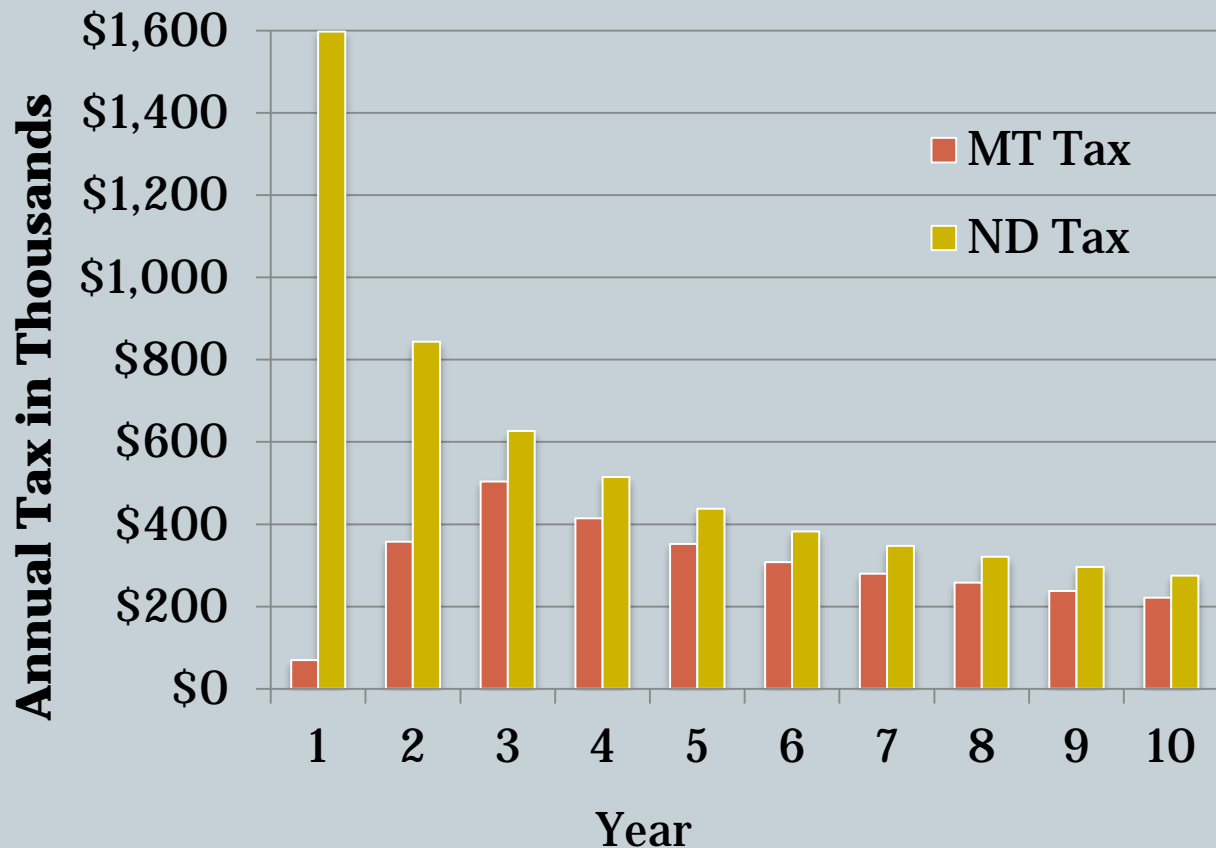
Avg. Production Rate



Oil Production and Extraction Tax Example



MT Taxes 40-50% of ND Taxes



Total Taxes

Montana-\$3.0 M

North Dakota: \$5.6 M

Based on
previous
production curve
and \$75/bbl local
price realization

Montana's Business Tax Climate



BUSINESS TAX CLIMATE RANKINGS

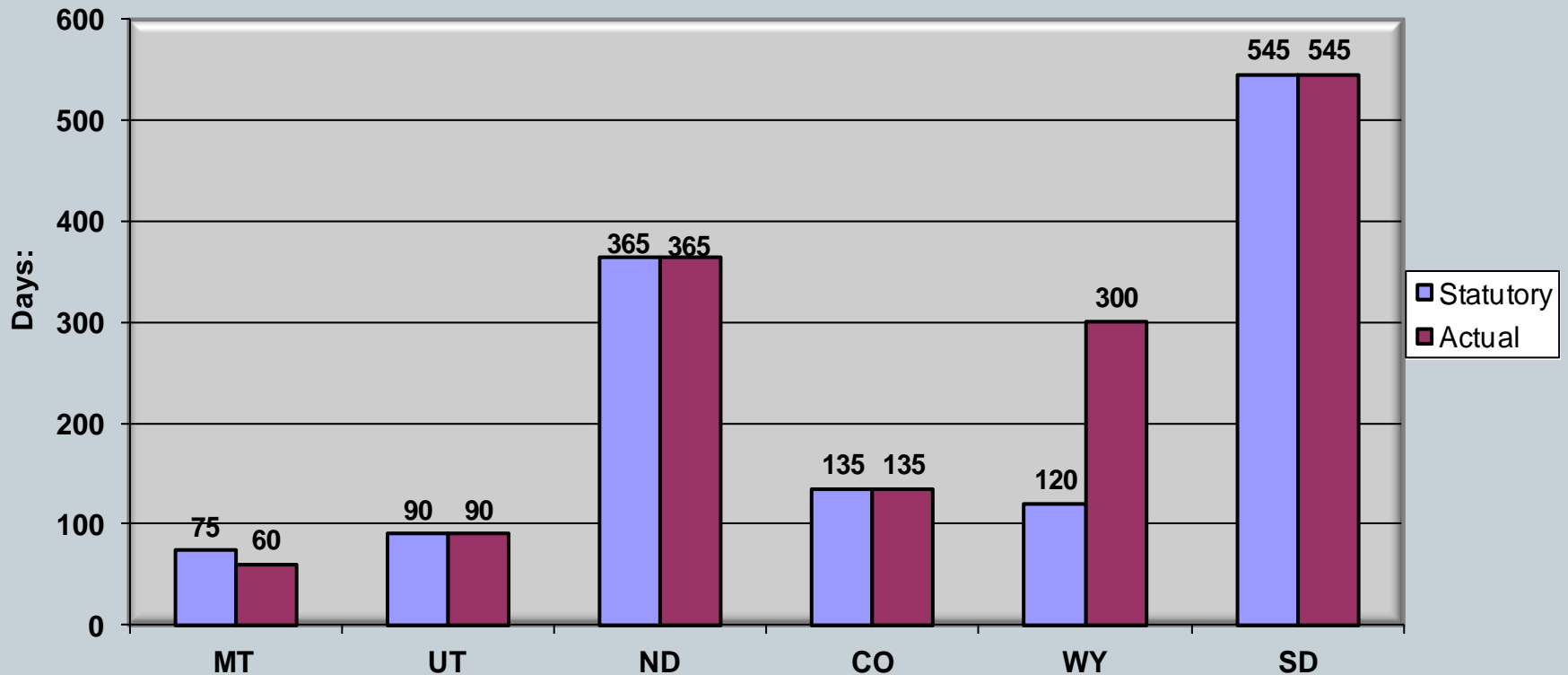
THE TAX FOUNDATION - FISCAL YEAR 2012



Permitting Comparison

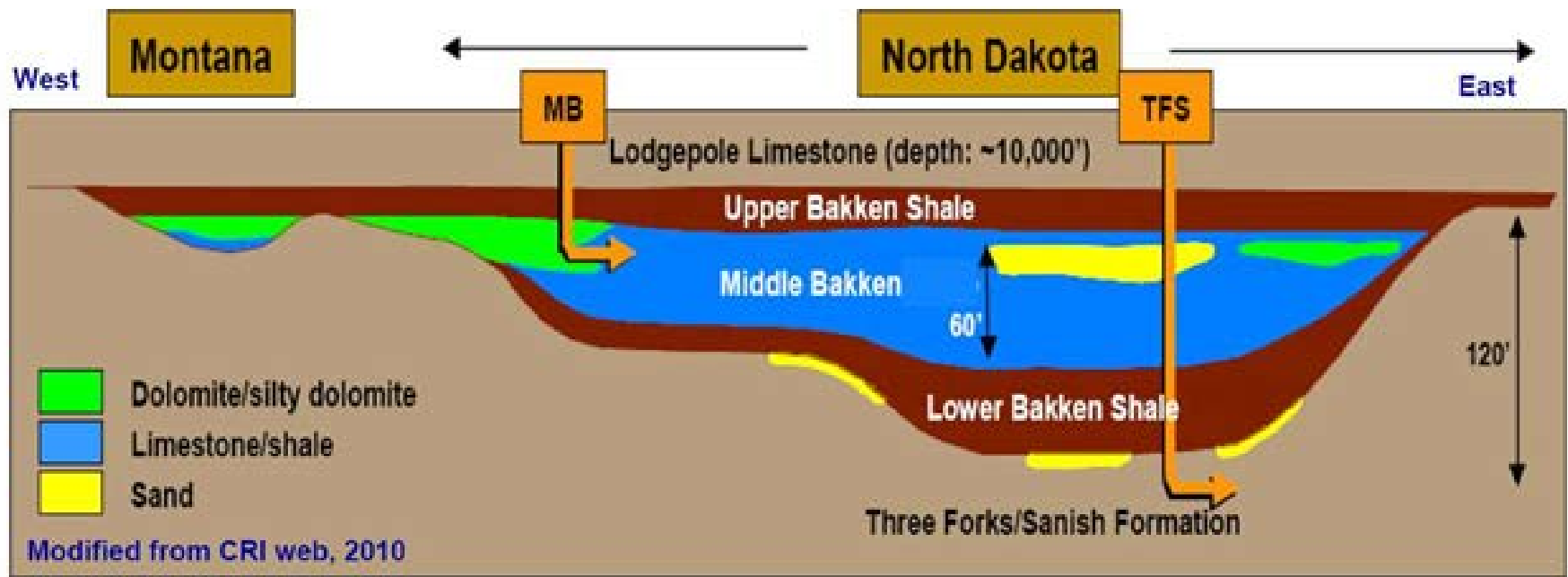


Final Decision Time (Statutory and Actual) for Air Quality Permits:



So why does ND have more activity than MT?

GEOLOGY

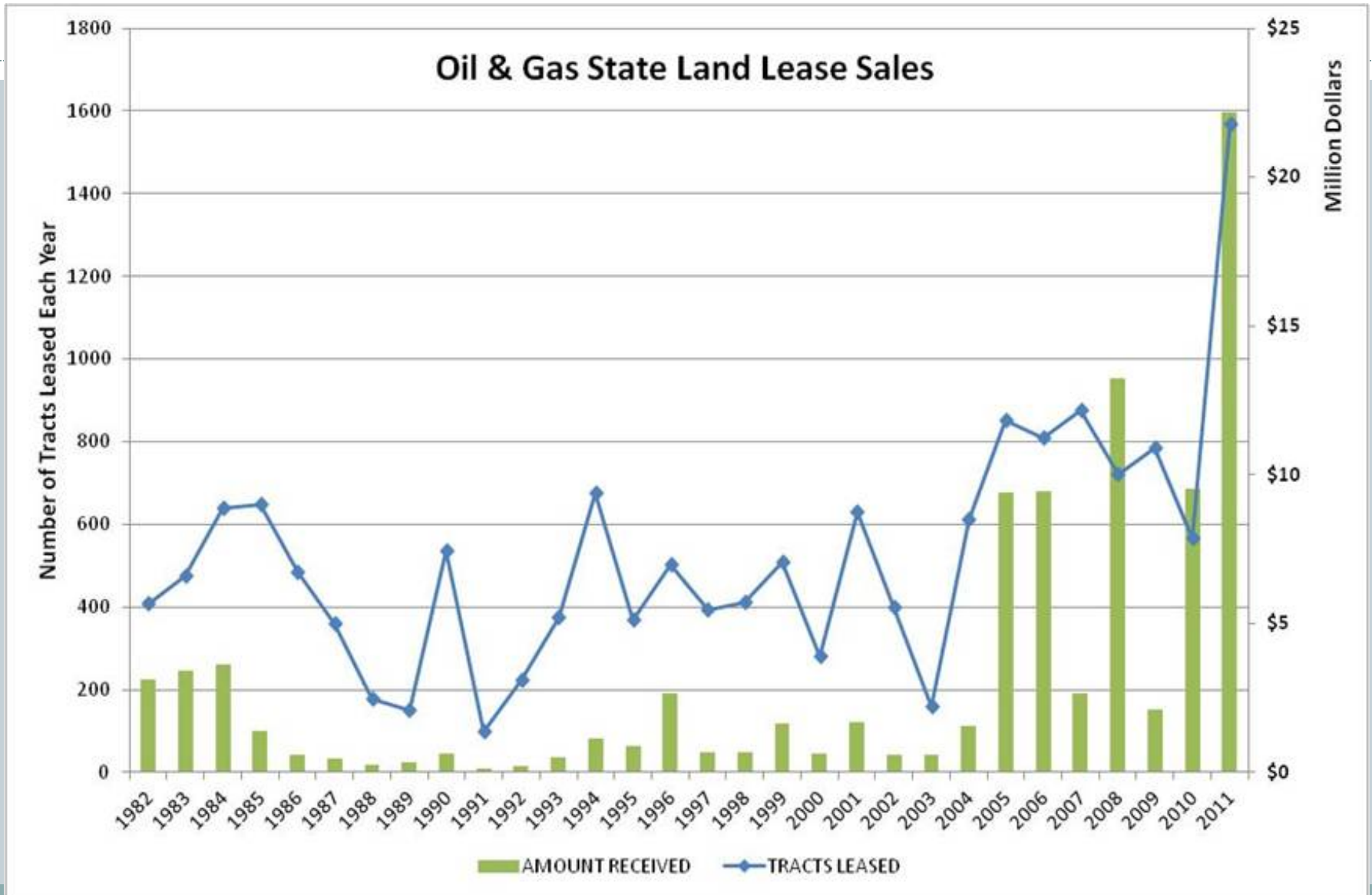


Recoverable Oil Estimates

3.0-4.3 Billion bbls-USGS. New estimate forthcoming

24 Billion bbls- Largest Bakken Operator (Hamm, Continental Resources)

O&G Leases



Montana Petroleum Industry



- **\$9+ BILLION:** Total economic impact – including E&P and Refining
- **4,600 Employees** in Exploration, Production, or Refining
- **Economic impact of an additional 1 million barrels of oil produced**
 - **86 Full time positions**
 - **\$18.5 million in labor income**
- **Drilling Rig Count Increased from 9 last year to 17 in January 2012**
- **More than 50 Billings businesses involved in Bakken activity**

Oil and Gas Impact Funds



O & G Impact Funds Counties: 2007-2011

**All O & G Producing
Counties (33)**

\$555 million

Top 12 Counties: Big Horn, Blaine,
Fallon, Glacier, Hill, Phillips, Powder River,
Richland, Roosevelt, Sheridan, Toole, Wibaux

\$515 million

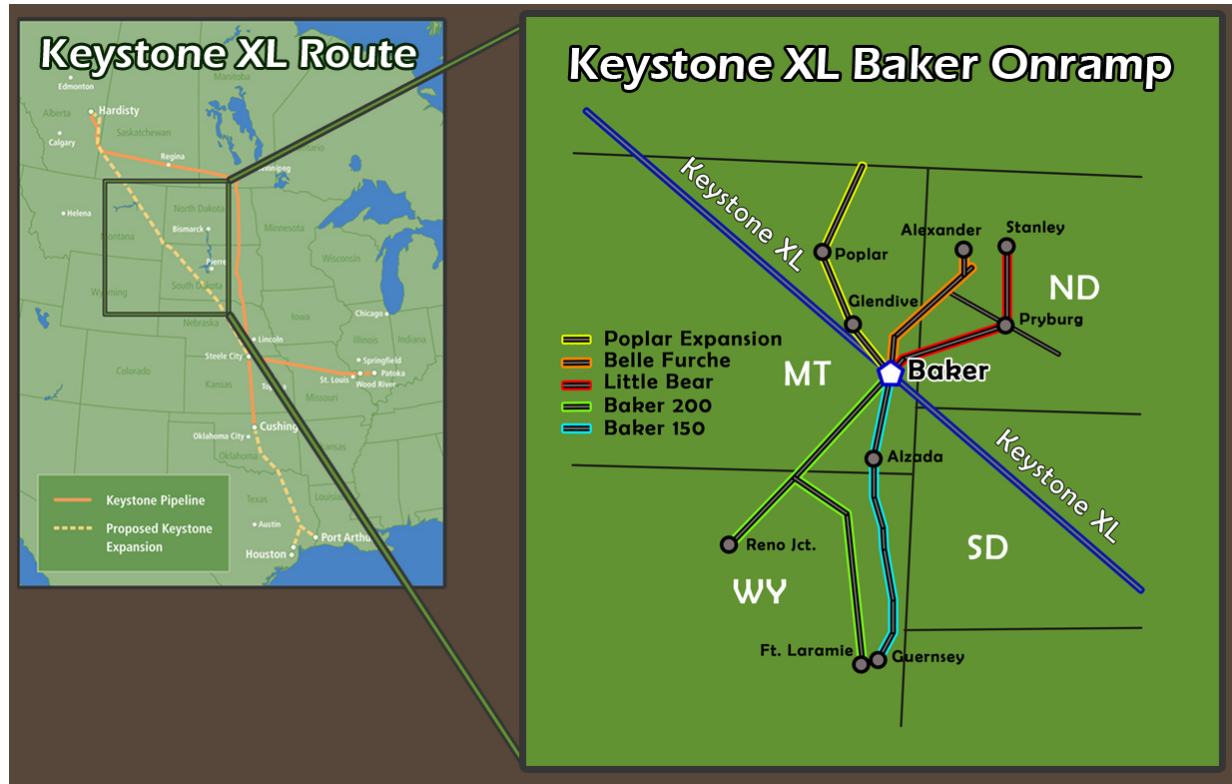
Richland County

**\$244 million
Over \$26,000/resident**

Value added through Keystone XL

- Approval delayed but project still very much alive
- Baker Onramp will initially allow 65,000 bpd of Bakken crude oil capacity
- Plan to resubmit application
- Alternative Nebraska completed by fall 2012
- May go forward with US only sections and apply for Fed permit later

The Keystone XL Pipeline and Baker Onramp

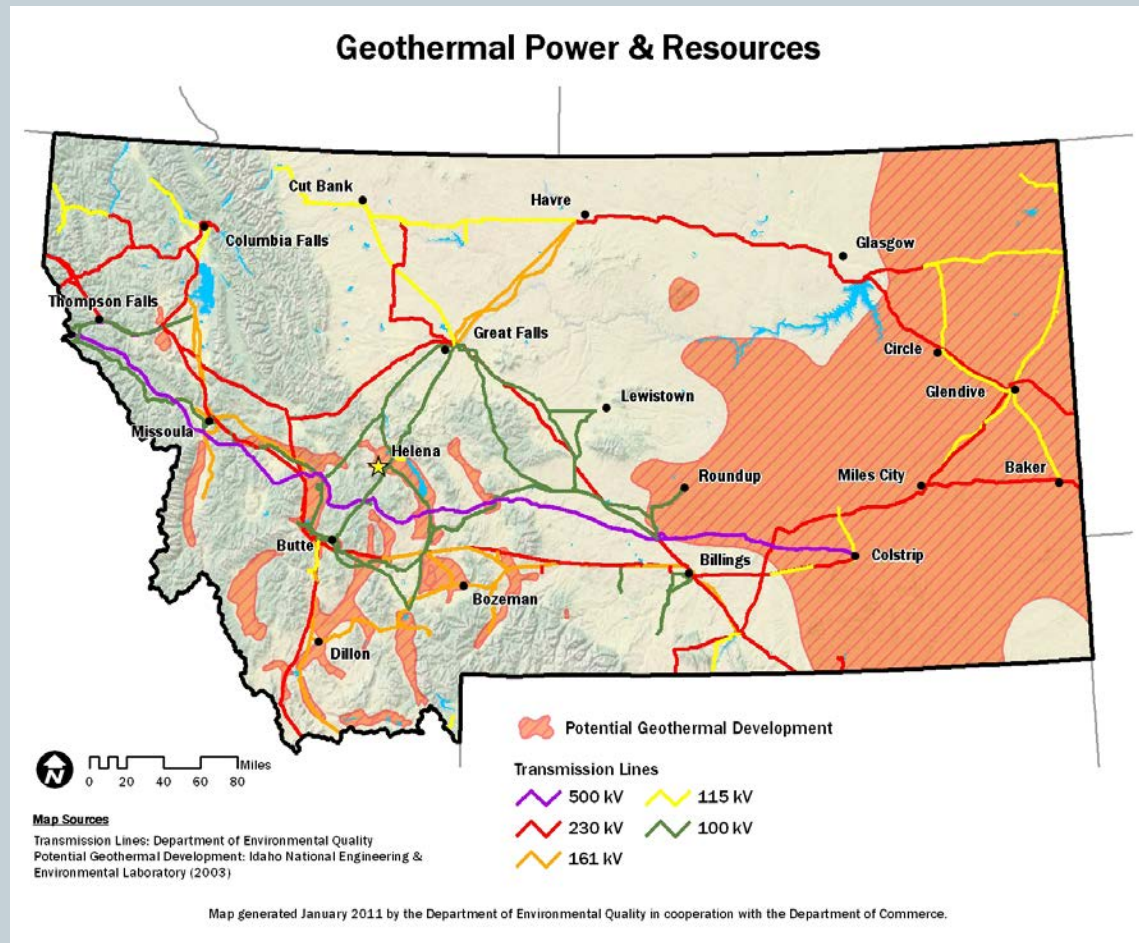


Opportunities between the Oil, Gas and Geothermal Industries

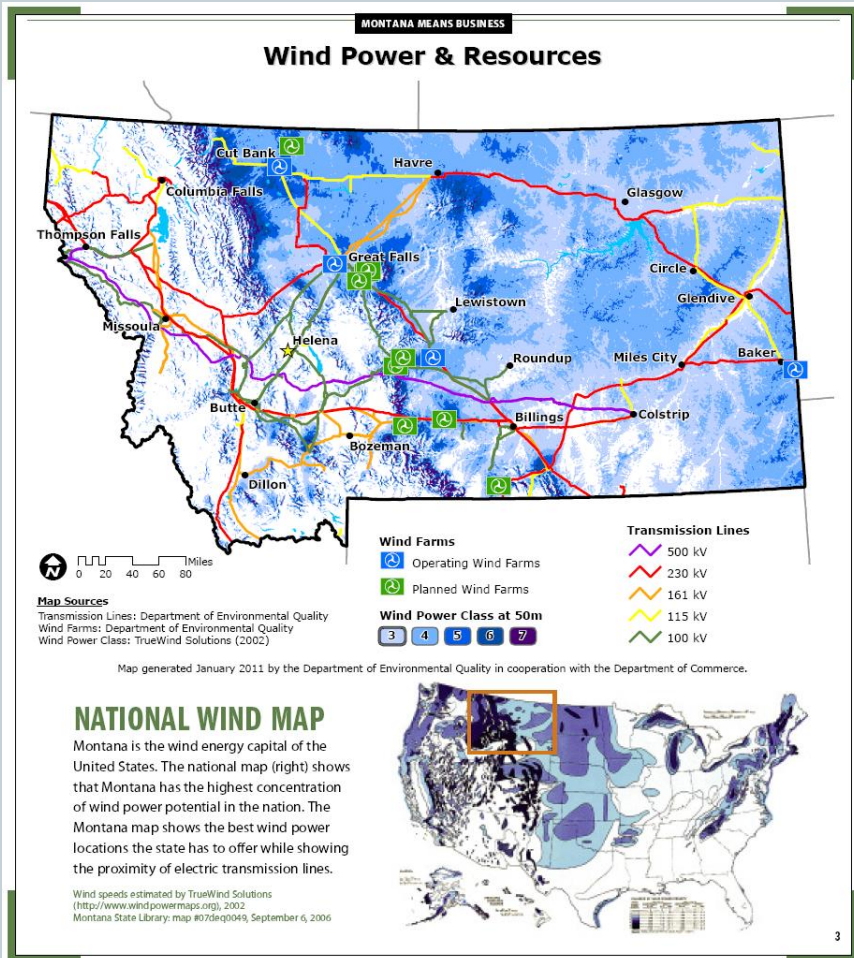
Montana has massive geothermal energy underneath its surface.

The Bureau of Mines and Geology has conducted a report on Montana's geothermal resources largely using data from oil and gas drilling.

Opportunities exist for these energy industries to combine their efforts to further development in Montana.



Montana: Where the Wind Blows



- Montana is #1 where it counts (Class 3 and above)
- Unique wind patterns
- 386 MW online
- \$812.5 million capital investment in existing WF's
- Rim Rock - \$700 million additional investment

Energy Investments and Direct Job Impacts to Montana

Wind Project	MW	Capital Investment	Direct Jobs
Horseshoe Bend WF	9	\$15 million	21
Diamond Willow WF	30	\$45 million	83
Judith Gap WF	135	\$202.5 million	162
Galcier I & II WFs	210	\$550 million	371
Totals:	384	\$812.5 million	637

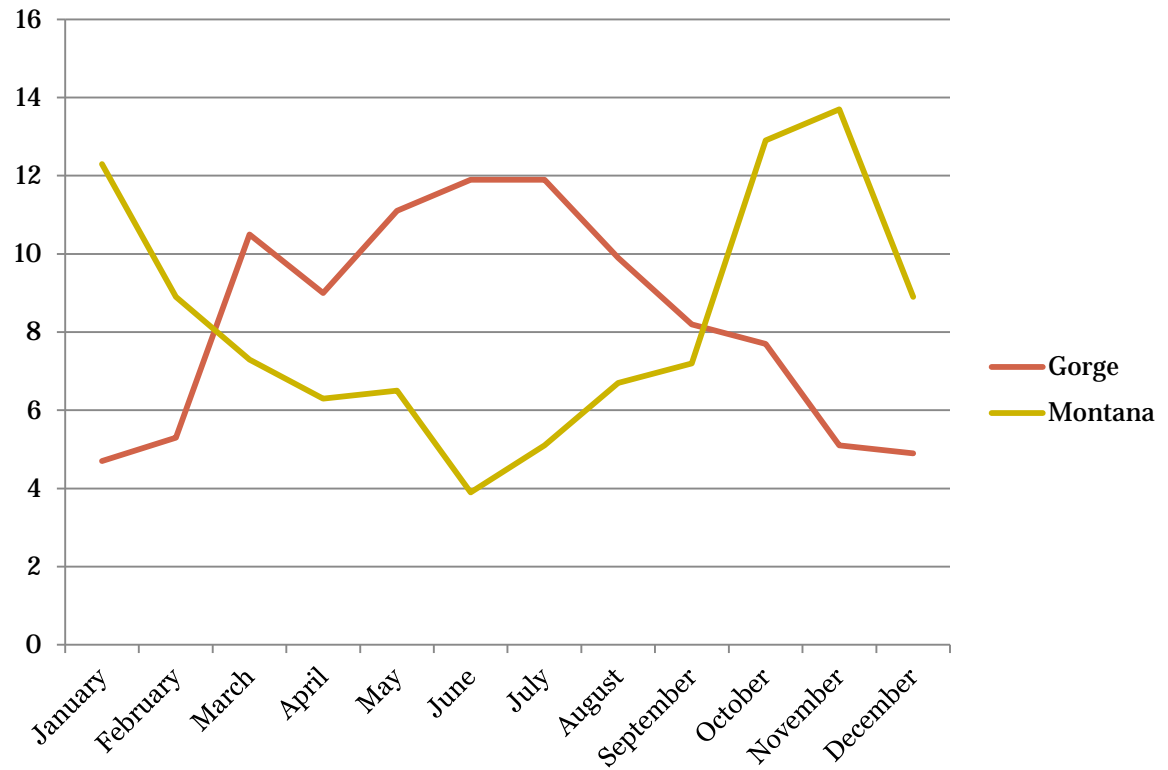


When the Wind Blows

Montana wind blows when it counts:

- During the day when energy demand is at its peak
- During the winter when energy is needed to heat homes and buildings throughout the region

Montana Wind vs. Washington Columbia Gorge Wind



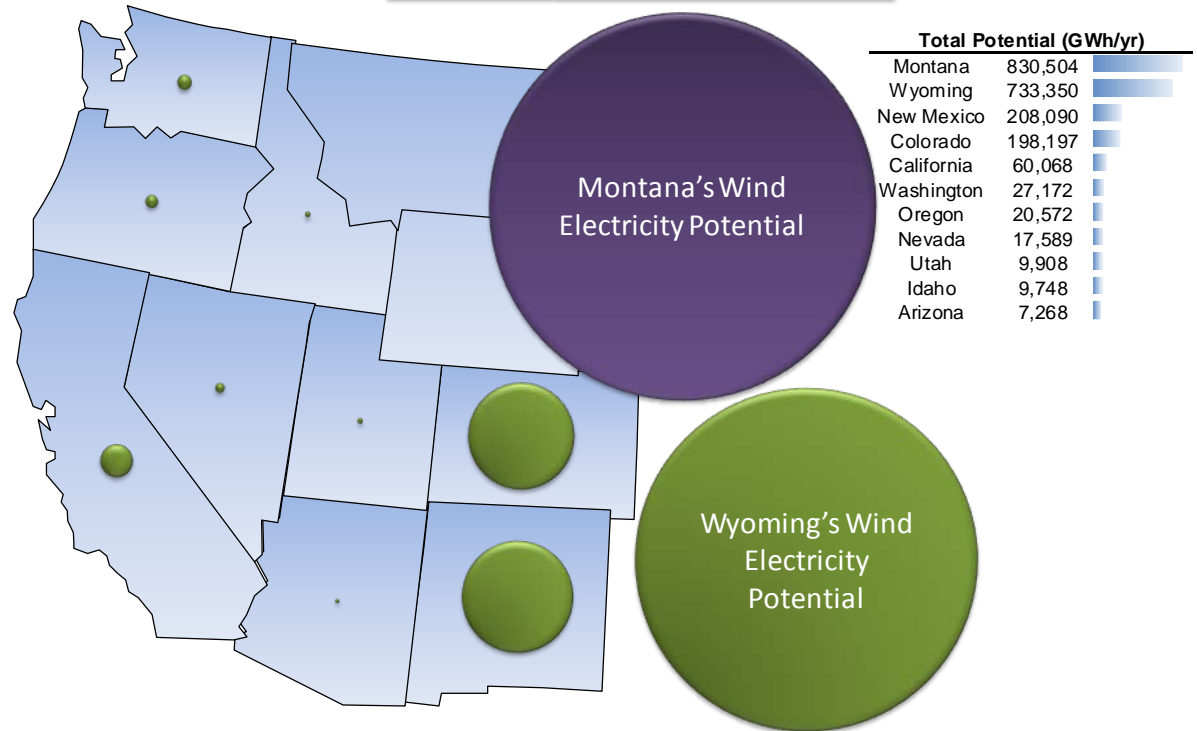
Energy Supply

Adversely, renewable energy supply is not located near the region's large demand near the pacific coast and southwest.

Montana's renewable resource supply must be able to reach these markets through an intelligent transmission system.

Western States Wind Energy Potential

Wind Electricity Potential
(GWh/yr) Class 4-7



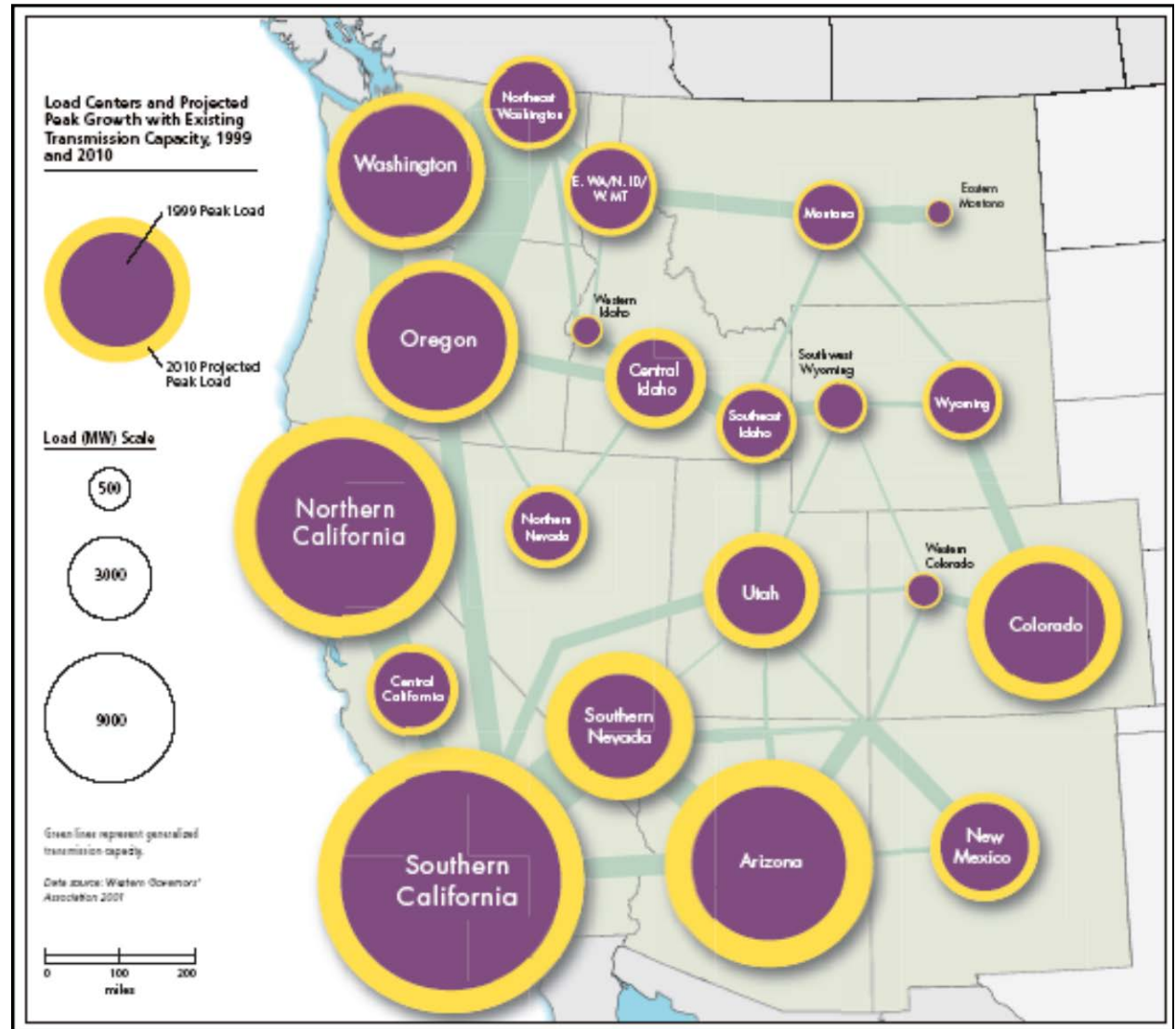
Prepared by Energy Strategies, LLC

● = scale of wind resources relative to Montana's

Montana's Export Markets

Regional market demand in the west is increasing. Renewable Energy Standards have also placed an increased demand on renewable energy.

Montana currently exports ~60% of its electrical generation; increased export is hindered by limited transmission capacity.

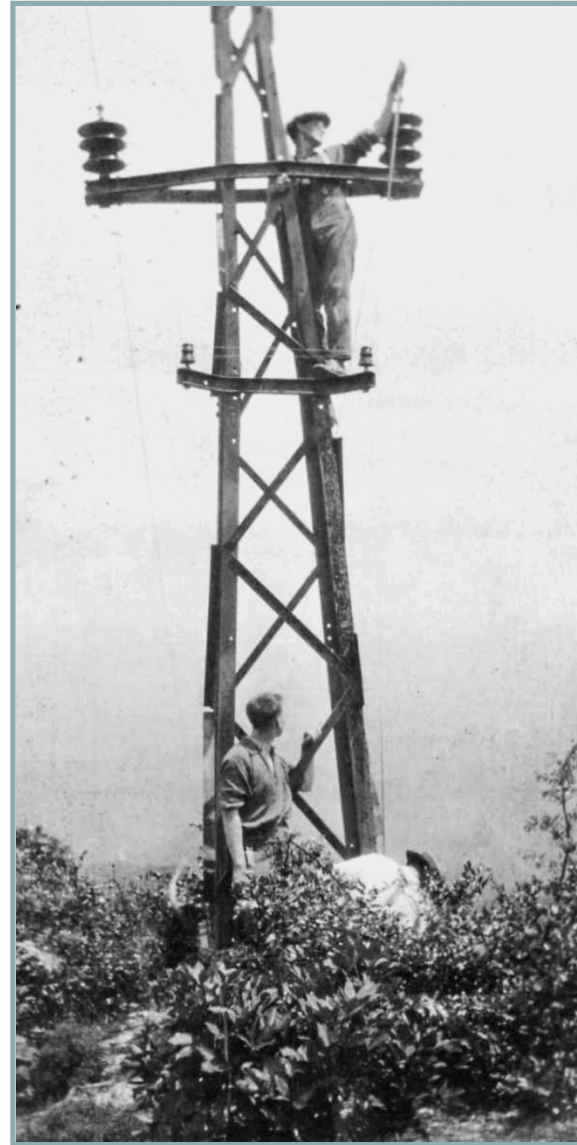




Transmission is Key

National energy security and stability requires a transmission system that is able to move energy supply to energy demand.

Creation of a transcontinental grid will enhance energy development from all sectors throughout the nation.



Montana Transmission for America

High-capacity, high-voltage interstate lines:

Montana Alberta Tie Line

Mountain States
Transmission Intertie

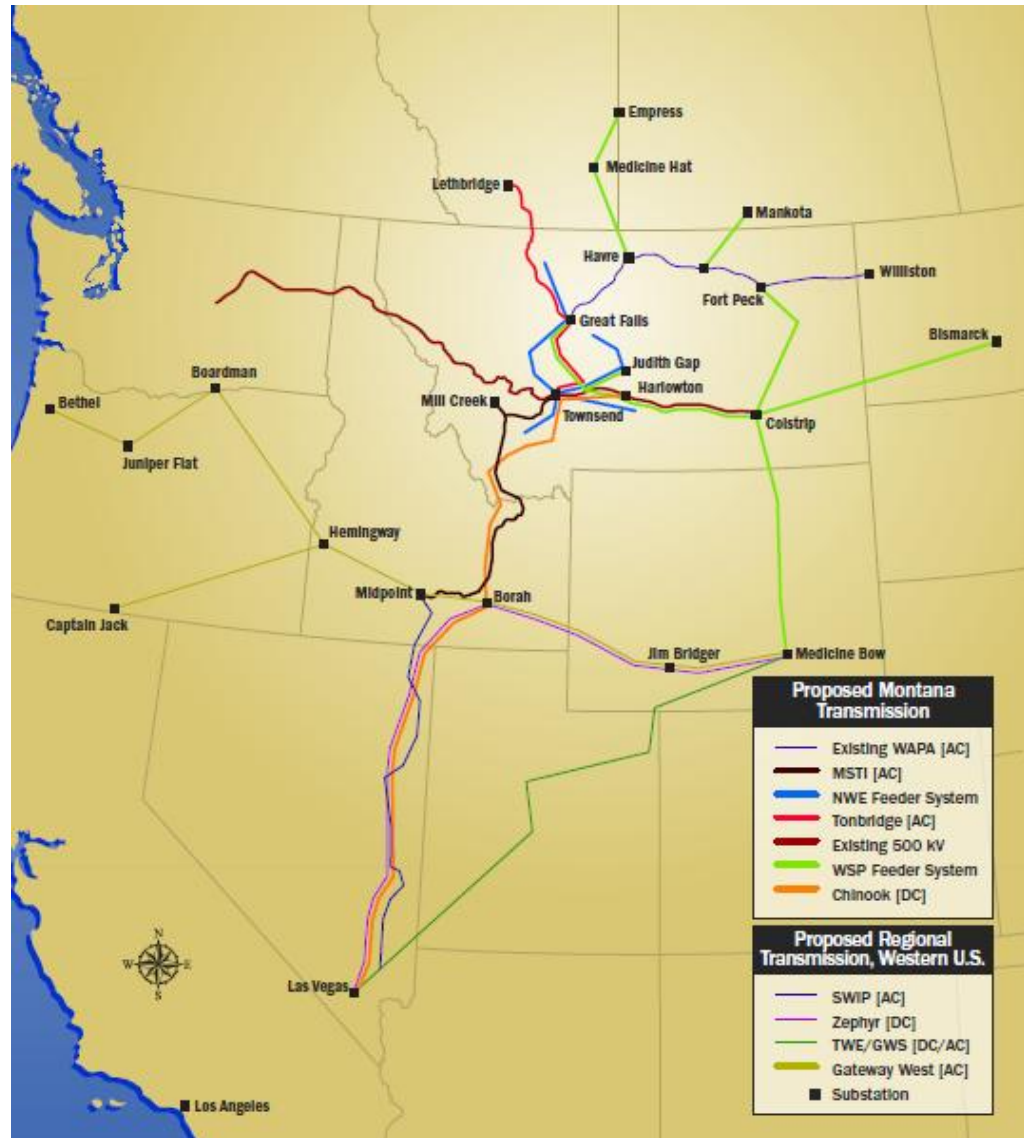
Chinook

Wind Spirit

Wind Collector
Systems:

NorthWestern Energy

Wind Spirit



Firming Montana's World-Class Wind

Pairing Montana's natural resources with firming and storage technologies

Pumped Hydro

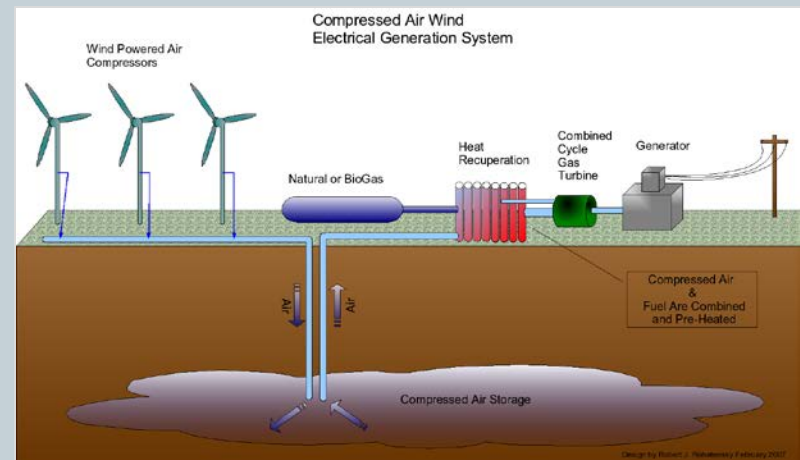
- Grasslands Gordon Butte Project
 - 4050 ac.ft., 350 MW

Battery

- Zinc Air
 - Zinc Redox batteries
 - 1MW /10MWh battery system
 - Juhl Wind Inc.

Compressed Air

- Gaelectric has considered a \$105 million, 140-megawatt plant



BioEnergy: Slow Growth in Montana

Montana's biofuels and biomass industries have maintained relatively small growth. The primary reason being economic feasibility.

The costs associated with bioenergy projects require either a very low cost bio material, or an integrated business plan which turns a profit from all or most of the byproducts.

Innovative business plans are finding success and a place for their products in the market.



Economic Benefits Glacier and Rim Rock



Forecast Project Payments to Local Montana Entities

<i>US\$ millions</i>	Glacier 1	Glacier 2	Rim Rock	Total
Term	25 Years	25 Years	25 Years	
Property Taxes	\$57.0	\$49.6	\$166.8	\$273.4
County Impact Fee	\$1.6	\$1.5	\$6.7	\$9.9
Landowners Royalty	\$30.5	\$27.8	\$85.9	\$144.2
Total	\$89.1	\$78.9	\$259.4	\$427.4
Total per Year (Average)	\$3.6	\$3.2	\$10.4	\$17.1

Source: NaturEner

Economic Benefits: Glacier and Rim Rock



Job Type	Glacier	Rim Rock (est.)	Total
Engineering	19	28	47
Direct Construction	206	303	509
Indirect Construction	80	117	197
Material Suppliers	<u>181</u>	<u>266</u>	<u>447</u>
Total Source:NaturEner	486	714	1,200

Wind Farm State and Local Tax Impact



Montana Wind Energy Tax Payments

	MW	Property Taxes 2010	~ Property Taxes After Tax Abatement Expiration
Glacier Wind Farm	210	\$3,708,734	\$6,200,000 (expires 2018)
Judith Gap	135	\$1,441,874	\$2,300,000 (expires 2015)
Diamond Willow	30	\$81,369	\$110,000 (expires 2017)
Horseshoe Bend	9	\$211,888	\$350,000 (expires 2017)
Totals	384	\$5,443,865	\$8,960,000

MT's Business Development Environment



- 8th best overall tax climate for business (Tax Foundation, 2012)
- MT's combined state and local tax burden of 8.7% ranks well below the national average of 9.8% (Tax Foundation, 2009)
- 4th most educated workforce (Business Facilities, 2009)
- 5th best cost of labor (Business Facilities, 2011)
- Workers comp costs reduced by 20% in 2011

Economic Benefits



- ✦ **TransCanada Keystone XL Pipeline and Baker on-ramp**
 - \$1.1 billion in capital investment in Montana
 - \$60 million in annual property taxes
 - 790 Construction jobs
 - 15 permanent jobs
 - 100,000 bbl/day on-ramp will provide more market access for Montana producers
- ✦ **Arch Coal Otter Creek Mining Operation**
 - 500+ construction jobs
 - 200 permanent jobs per mine (2 mines proposed)
 - \$5 billion potential in state and local taxes over the life of the mine

Economic Benefits



- ✦ **Turnbull Hydroelectric Project - 13 MW**
 - \$10 million capital investment
 - 30 construction jobs
 - 1.5 permanent jobs
- ✦ **NorthWestern Energy Mill Creek Regulating Plant— 150 MW**
 - \$206 million capital investment
 - 75 construction jobs
 - 11 permanent jobs
- ✦ **Basin Electric Natural Gas Peaking Plant— 91 MW**
 - \$100 million capital investment
 - 50 construction jobs
 - 7 permanent jobs
- ✦ **Basin Electric Waste Heat Recovery Plant— 5.5 MW**
 - \$10 million in capital investment
 - 10 construction jobs
 - 1 permanent jobs

Energy Development is Good Economics



Transmission projects also bring millions of dollars of economic impact to local and state economies.

Economic Impacts Estimates for Montana Transmission Projects

Project	2007 Real Dollars of Montana Capital Expenditure	Direct Jobs	Direct Jobs per Year	Total Jobs	Total Jobs per Year	Direct Impact (2010 Dollars)	Total Impact (2010 Dollars)
MSTI	\$616,431,000	742	186	1203	301	\$68,865,272	\$120,046,544
MATL	\$162,132,000	360	180	720	360	\$52,492,984	\$92,173,816
NWE Collectors	\$842,455,000	2082	416	3980	796	\$272,759,520	\$482,279,520
Grasslands	\$1,474,639,000	1776	592	2878	959	\$164,735,952	\$287,169,472
TransCanada Chinook Line	\$939,502,000	1131	283	1833	458	\$104,947,160	\$182,945,424
NorthWestern Upgrades (Colstrip)	\$215,751,000	546	273	1034	517	\$86,951,160	\$140,643,872
Total:	\$4,250,910,000	6,637	1930	11648	3391	\$750,752,048	\$1,305,258,648

Regional Issues



- **RTEP/WREZ – Regional Transmission Expansion Project**
- **BPA – Environmental Re-dispatch and Network Open Season**
- **WAPA – Transmission Infrastructure Program**
- **Montana Intertie**
- **Eminent Domain**
 - **Montana legislation – HB 198**
 - **Wyoming moratorium on Eminent Domain for wind collector lines**
- **Renewable Energy and different approaches to transmission siting**

Energy & Economics Going Forward



- Increased domestic demand for renewable generated electricity
- Increased global demand for coal
- Importance of infrastructure
 - Electrical transmission
 - Railroad
 - Value-added opportunities
- Real opportunities for tech/start-ups

Conclusion



- **Montana has vast Energy Resources**
 - Renewable and Traditional
- **Transmission capacity is essential to continued generation development**
 - Development of our energy resources hinders upon our ability to deliver a product to larger markets
 - A stable energy grid requires an integrated transmission system
- **Energy Development is Good Economics**
 - Billions of dollars in capital investment, millions of dollars in state and local revenues, and thousands of jobs are being generated due to new energy development in Montana.
 - Innovation within this industry will come from supporting our universities and R&D programs.

Oil- Bioenergy - Coal

MONTANA MEANS ENERGY

Geothermal - Gas - Wind

120 BILLION TONS OF COAL
#1 IN WIND CLASS 3 AND ABOVE
35.5 MILLION ACRES OF BIOENERGY POTENTIAL
HOME TO THE BAKKEN OIL AND GAS FORMATION
VAST GEOTHERMAL AND SOLAR POTENTIAL



CONTACT THE ENERGY PROMOTION AND DEVELOPMENT DIVISION AT:
COMMERCE.MT.GOV/ENERGY - 406.841.2030
OR THE GOVERNOR'S OFFICE OF ECONOMIC DEVELOPMENT AT:
BUSINESS.MT.GOV - 406.444.5634



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